Publication No. 83-e20

# A SUMMARY OF PRIORITY POLLUTANT DATA FOR POINT SOURCES AND SEDIMENT IN INNER COMMENCEMENT BAY: A PRELIMINARY ASSESSMENT OF DATA AND CONSIDERATIONS FOR FUTURE WORK

## PART 3. BLAIR WATERWAY

by

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July 1983

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## INTRODUCTION

This document is part of a larger compilation and review of data on priority pollutant concentrations in point source discharges and surface sediments in Commencement Bay and adjacent waterways collected between 1979 and 1982 and reported by WDOE, EPA, and NOAA. Also presented here are hitherto unpublished data from WDOE point source sampling and a series of sediment collections made by EPA and WDOE. Water column data were also reviewed for this report; they were not, however, tabulated. Pollutant concentrations in biota and biological responses to water and sediment samples were not, in general, reviewed. Data on organic compounds not classified as priority pollutants were also not reviewed.

The report is arranged by waterway in the six parts listed below; each to be issued in separate installments as the data are compiled and reviewed. The third installment, Blair Waterway, is included with these introductory remarks.

| | Subject | Anticipated Completion Date (1983) |
|---|---|---|
| Part 1. | Hylebos Waterway | Completed |
| Part 2. | City Waterway | Completed |
| Part 3. | Blair Waterway | Completed |
| Part 4. | Sitcum Waterway | August |
| Part 5. | Milwaukee, Puyallup, St. Paul, Middle Waterways and S.W. Shore Commencement Bay | August |
| Part 6. | Summary | August |

This information was gathered with the aim of providing direction for the next phase of work in the Commencement Bay near-shore marine environment. In the interest of putting together a useful package in a timely fashion, an outline format is used.

## SAMPLING AND ANALYTICAL METHODS

The results presented here are from studies conducted by a number of investigators and should be compared with caution because of the variable collection, extraction, and analytical methods employed. Even a casual review of the data will reveal that detection limits vary between laboratories and that certain compounds are regularly reported in some studies and rarely reported in others. The importance of consistent sampling techniques and analytical methods in future Commencement Bay investigations cannot be over-emphasized.

The methods employed in obtaining most of the data compiled here are described in the reports cited at the end of each data package. The WDOE point source data on discharges other than ASARCO, St. Regis, Tacoma Central STP, U.S. Oil, Reichhold, Pennwalt, Sound Refining, and Hooker (which are documented in WDOE "Class II" reports) and the data on sediment samples collected by EPA and WDOE on 5/13/81, 7/31/81, and 8/03-04/81 are being reported for the first time. The procedures used in obtaining these new data are briefly described below.

The WDOE point source samples were collected in one-gallon glass jars (base/neutrals, acid extractables, pesticides, and PCBs), 40 ml screw-top glass vials with teflon septums (volatiles), and 2-1/2 or 5-gallon polyethylene cubitainers (trace metals and conventional water quality parameters*). Sample bottles were cleaned according to EPA priority pollutant protocol. Laboratory and field blanks were included in conjunction with the point source samples as a check against sample contamination. All samples were composites, typically collected over a 2 - 6 hour period. Rising tides precluded long compositing periods at a number of discharges. Flows were measured with a magnetic flowmeter or bucket and stopwatch.

The analytical plan included sample analysis at several different laboratories. Organics analysis was done by EPA contract laboratories. Trace metals were analyzed at the WDOE Tumwater laboratory. Joe Blazevich, EPA Region X laboratory at Manchester, reviewed the organic priority pollutant data reported by the contract laboratories prior to inclusion in this report.

The intertidal sediment samples taken by WDOE on 7/30-31/81 were collected by hand using a stainless steel "cookie cutter" measuring 9 cm in diameter and 2.5 cm deep. Several samples were taken along a transect of the lower beach, usually below or near a point source discharge, and pooled. After mixing with a glass rod, subsamples were placed in glass (organics analysis) or plastic (trace metal analysis) containers and analyzed as described above. A third portion of the sample was sent to the EPA Newport laboratory for bioassay using amphipods as the test organism. (The results of bioassay tests were reported by R.C. Swartz in the Marine Pollution Bulletin Vol. 13, No. 10, pp. 359-364, 1982.)

The subtidal sediments collected by EPA and WDOE on 5/13/81 and 8/03-04/81 were taken with a Van Veen grab modified with rubber flaps to reduce loss of surface fines during retrieval. Subsamples of the top 2 cm were taken by core and analyzed as described above, except that a few samples were analyzed by the EPA Newport laboratory for a limited number of priority pollutants only.

*These data are available on request.

# PART 3. BLAIR WATERWAY

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# BLAIR WATERWAY

Refer to Data In:

## General Observations

1. A preliminary comparison of Blair Waterway sediment priority pollutant data with the data available on sediment in other Commencement Bay waterways indicates Blair is substantially less contaminated than Hylebos, City, or Sitcum Waterways. Nevertheless, Chapman (reference 3), using a suite of lethal and sublethal bioassays on sediment from Commencement Bay and other parts of Puget Sound, ranked Blair Waterway along with Hylebos Waterway as the third most toxic site tested (behind City Waterway and Elliot Bay near the Denny Way CSO). Blair was included among those areas recommended for additional in-depth study.

## General Considerations for Future Work

1. A substantial body of data exists on contaminants in water, suspended matter, sediment, and point source discharges in Blair Waterway. Among the major missing pieces of information are the sedimentation rate, depositional history of metals in the sediment, and flux of contaminants between the waterway and Commencement Bay.

2. As has been noted previously in Parts 1 and 2 of this report, there is a need for criteria establishing the concentrations of contaminants in sediment that represent a hazard to marine life and public health.

3. Four sites in Blair Waterway worthy of further examination as potential sources or "hot spots" for metallic and organic priority pollutants are: Murray Pacific log sort yard (metals); Lincoln Avenue south drain (metals and organics); north shoreline between 11th Street and Lincoln Avenue (volatiles); and sediment near 11th Street bridge (polyaromatic hydrocarbons).

## Metals - Observations

1. Extremely high concentrations of As, Cu, Pb, Sb, and Zn have been measured in runoff from the Murray Pacific log sort yard. The source of these metals is thought to be ASARCO slag used as ballast. Runoff from the other sort yard on Blair, West Coast Orient, has not been sampled. This yard also used ASARCO slag. Log sort yards in the Tacoma tideflats area recently agreed to comply with a request from WDOE to use other materials for ballast. — Table 18

2. Lincoln Avenue drain on Blair's south shore (and adjacent to Murray Pacific) had an arsenic concentration of 850 µg/L in a sample collected during wet-weather conditions (3/28/82). Dry-weather arsenic concentrations were much lower. — Table 18

3. Other discharges where elevated metals concentrations have been observed are two seeps at the mouth of the waterway near the Zidell shipyard. — Table 18

| | | Refer to Data In: |
|---|---|---|
| 4. | The largest metals loads to Blair Waterway measured during WDOE surveys were from the south shore Lincoln Avenue drain -- 19, 3.8 2.2, and 1.1 pounds per day of As, Zn, Pb, and Cu, respectively. Metals loads from log sort yards have not yet been measured. | Table 19 |
| 5. | Dames & Moore and EPA (references 4 and 11) water column data for Blair Waterway show metals were generally within EPA criteria for the protection of marine life, except Cu and Se in the EPA samples which exceeded maximum recommended values. Samples from the EPA control station at Browns Point also exceeded the Cu and Se criteria. | |
| 6. | Metal concentrations in Blair surface sediments are not high relative to other waterways (i.e., Sitcum, City, and Hylebos). | Table 24<br>Table 25<br>Table 26 |
| 7. | There is a peak in metals concentrations in subtidal sediments in the central part of Blair Waterway. The Lincoln Avenue discharge and runoff from the Murray Pacific yard are possible sources. Lincoln Avenue drain has high metals concentrations in sediments at Milwaukee Street and at the drain's mouth on the waterway south shore. | Figure 14<br>Table 24 |
| 8. | Amphipod bioassays conducted by Swartz (reference 10) showed lowest survival in samples of sediment from the central part of the waterway. This pattern was not observed in biological tests conducted by other investigators (references 3 and 8). | |

Metals - Considerations for Future Work

1. Metals loads from the two sort yards on Blair Waterway should be quantified. The relationship between metals in sort yard runoff and waterway sediments should be assessed.

2. Metals in the Lincoln Avenue south drain also appear to be a problem warranting further study.

3. Data on metals stratification in Blair Waterway sediments should be obtained from core samples.

Volatiles - Observations

| | | |
|---|---|---|
| 1. | Detection of volatiles in point source discharges to Blair Waterway has been largely restricted to the north and south Lincoln Avenue drains. Detection frequencies have been highest in the south drain. Seven compounds (chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,2-trans-dichloroethylene, 1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene) have been detected in two or more of the four samples collected by EPA and WDOE in the south drain. Concentrations were generally less than 10 µg/L. | Table 20 |

| | | Refer to Data In: |
|---|---|---|
| 2. | Based on WDOE Class II inspections and receiving environment surveys (references 1, 2, 14, 15), the two major NPDES dischargers to Blair Waterway (Reichhold Chemicals and U.S. Oil) are not significant sources of volatiles. However, a number of volatiles have been detected in the Reichhold storm drain system. With sufficient runoff, this drain overflows into the Lincoln Avenue north drain. Spills at the Lillyblad plant, a solvent recycler, have been documented by WDOE inspectors as a source of volatiles to Lincoln Avenue south drain. | Table 21 |
| 3. | The largest point source loads measured for individual volatile compounds were about 0.1 pounds/day. | Table 22 |
| 4. | EPA (reference 10) has collected grab samples of surface and bottom waters from eight sites in Blair Waterway. Most samples did not contain detectable concentrations of volatiles. Chlorodibromomethane, 1,1,1-trichloroethane, trichloroethylene, and methylene chloride were detected at 1 µg/L or less in two or three of these samples, depending on the compound in question. | |
| 5. | Riley (reference 9), using more sensitive methods, was able to quantify a number of volatiles (methylene chloride, haloforms, chlorinated -ethanes and -ethylenes, benzene, and toluene) in surface waters at four sites along Blair's north shore between 11th Street and Lincoln Avenue. The compound present in the largest concentrations, up to 33.5 µg/L, was 1,1,1-trichloroethane. | |
| 6. | Volatiles concentrations were not in excess of EPA criteria for protection of marine life in the above-mentioned water column samples. | |
| 7. | Both the EPA and Riley surveys indicate Blair Waterway has lower concentrations of volatiles in the water column than Hylebos Waterway. | |
| 8. | Volatiles have not been detected in Blair Waterway sediment. A sample from within the Lincoln Avenue north drain had .006 mg/Kg toluene and .003 mg/Kg 1,1-dichloroethane. | Table 24<br>Table 25<br>Table 26 |

Volatiles - Considerations for Future Work

1. In light of the relatively large concentrations of volatiles measured by Riley, a survey of volatiles in seeps and drains on Blair's north shore between Lincoln Avenue and 11th Street should be conducted. Additional samples for volatiles analysis should also be collected from the Lincoln Avenue south shore drain.

Base/Neutrals and PCBs - Observations

1. The highest detection frequencies for base/neutral compounds in discharges to Blair Waterway have been in samples from the Lincoln Avenue — Table 20

Refer to Data In:

south drain. 1,2-dichlorobenzene was the only compound routinely detected (three of four samples). All concentrations measured have been less than 10 µg/L. PCBs have not been detected in point source samples.

2. As was the case for volatiles, WDOE measured loads of base/neutrals to the waterway have been small (i.e., 0.1 pounds/day or less for individual compounds). Table 22

3. EPA (reference 11) did not detect base/neutrals or PCBs in water column samples.

4. Riley (reference 9) measured the following concentration ranges for selected base/neutrals and PCBs in the water column:

| | |
|---|---|
| $Cl_3$-butadiene-1 | <2 - 124 ng/L (pptr) |
| $Cl_3$-butadiene-2 | <2 - 54 " |
| hexachlorobutadiene | <1 - 4 " |
| $Cl_1$-biphenyls | 34 - 154 " |
| $Cl_2$-" | <3 - 106 " |
| $Cl_3$-" | <1 - 24 " |
| $Cl_4$-" | <1 - 1 " |
| $Cl_5$-" | <1 - <2 " |
| Total $Cl_1$-$Cl_5$-biphenyls | 34 - 212 " |

Hexachlorobutadiene (HCBD) did not exceed the 32 µg/L EPA considers acutely toxic to marine life; EPA has no chronic HCBD criteria. All of the total selected chlorinated biphenyl concentrations measured exceeded EPA's suggested 0.030 µg/L 24-hour average criteria recommended as protective of marine life. There are no criteria for the lower chlorinated butadienes. PAH were not measured in Riley's water samples.

5. Riley (reference 9) also measured the following concentrations ranges for selected base/neutral compounds and PCBs in suspended matter:

| | |
|---|---|
| $Cl_3$-butadiene-1 | <10 - 295 µg/Kg, dry |
| $Cl_3$-butadiene-2 | 10 - 186 " |
| hexachlorobutadiene | <1 - 21 " |
| $Cl_1$-biphenyl | <6 - 61 " |
| $Cl_2$-" | <3 - <253 " |
| $Cl_3$-" | 4 - 133 " |
| $Cl_4$-" | <2 - 494 " |
| $Cl_5$-" | <1 - 152 " |
| Total $Cl_1$ - $Cl_5$ biphenyls | 6 - 779 " |
| Total polyaromatic hydrocarbons* | 2,637 -19,207 " |

*18 compounds

6. The concentrations of HCBD and chlorinated biphenyls measured by Riley in Blair suspended matter are similar to concentrations in the Blair subtidal sediments. Table 24 Table 25 Table 26

| | | Refer to Data In: |
|---|---|---|
| 7. | EPA and WDOE surveys have not detected butadienes or chlorinated biphenyls in point source discharges. Naphthalene and fluorene are the only polyaromatic hydrocarbons that have been detected -- although infrequently. | |
| 8. | Blair sediment concentrations of HCBD are low relative to Hylebos Waterway. | |
| 9. | PAH concentrations in sediment are lowest in the first mile of Blair Waterway (as measured from the head) and increase substantially seaward of this point. Whether this indicates the location of predominant sources or is related to the relatively recent (1964-1966) excavation of the inner waterway is not known. | Figure 15 |
| 10. | Riley (reference 9) found extremely high concentrations of naphthalenes (2.4 mg/Kg naphthalene, 3.4 mg/Kg 2-methyl naphthalene) in a sediment core near the 11th Street bridge. Recent analyses done by Laucks Testing Laboratories for the Port of Tacoma (unpublished data) confirm that high PAH concentrations exist in sediments from this part of Blair Waterway. In general, however, PAH concentrations are lower in Blair than in other waterways such as Hylebos and City. | |
| 11. | A large concentration of bis(2-ethylhexyl) phthalate, 22.0 mg/Kg dry, was reported in a sediment sample at the mouth of the Lincoln Avenue south drain. | Table 24 |

Base/Neutrals and PCBs - Considerations for Future Work

| | | |
|---|---|---|
| 1. | In light of the substantial concentrations of chlorinated butadienes and chlorinated biphenyls measured in the water column, additional work should be aimed at determining the sources, fate, and effects of these compounds in Blair Waterway. | |
| 2. | Based on available data, the Lincoln Avenue south drain is the only point source discharge where additional monitoring for base/neutrals appears warranted. | |

Acid Extractables - Observations

| | | |
|---|---|---|
| 1. | Detection of acid extractables in discharges to Blair has been limited to the detection of pentachlorophenol in the north and south Lincoln Avenue drains. | Table 20 |
| 2. | Reichhold Chemicals storm drain effluent is a potential source of phenols in the Lincoln Avenue north drain. Phenol, 2-chlorophenol, 2,4-dichlorophenol, 2,4,6-trichlorophenol, and pentachlorophenol have been identified in this effluent. | Table 21 |
| 3. | Acid extractables have not been detected in Blair Waterway sediments. | Table 24<br>Table 25 |

Refer to Data In:

Acid Extractables - Considerations for Future Work

1. The Lincoln Avenue north drain is the only point source discharge where additional monitoring for acid extractables appears warranted.

Pesticides - Observations

1. Detection of pesticides in discharges to Blair has been limited to traces of aldrin and $\alpha$-BHC in one sample from the Lincoln Avenue south drain. Table 20

2. Riley (reference 9) did not detect pesticides in water column suspended matter.

3. NOAA measured DDT compounds at low concentrations in sediment samples from the two sites sampled in Blair. DDT was not at detectable levels in samples analyzed by other investigators. Table 24 Table 25 Table 26

Pesticides - Considerations for Future Work

1. Pesticides do not appear to be a problem in Blair Waterway.

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15. Yake, B., 1981. U.S. Oil and Refining Co., Class II Inspection of May 5 and 6, 1981. WDOE memorandum to Fred Fenske.

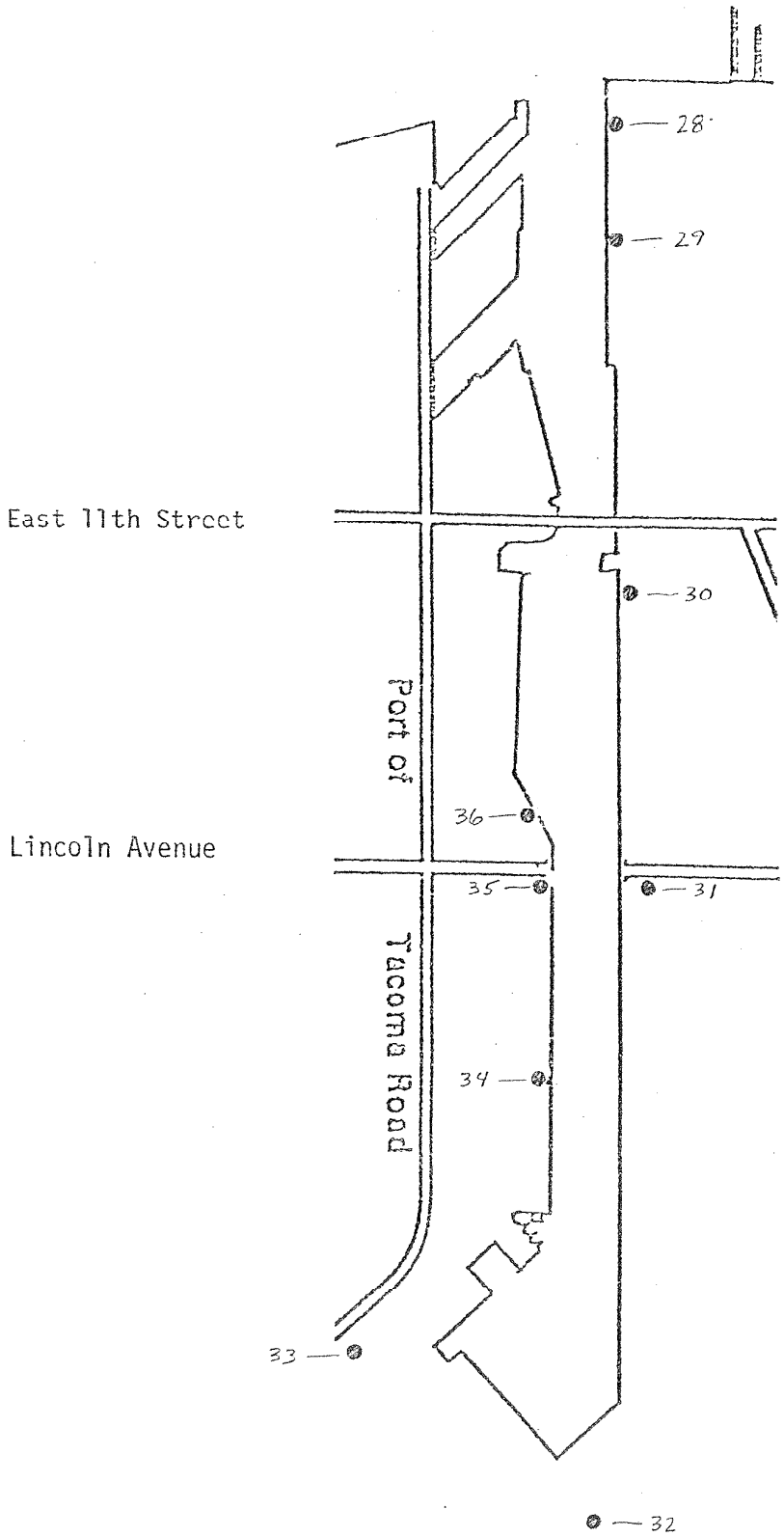


Figure 12. Blair Waterway: point source samples.

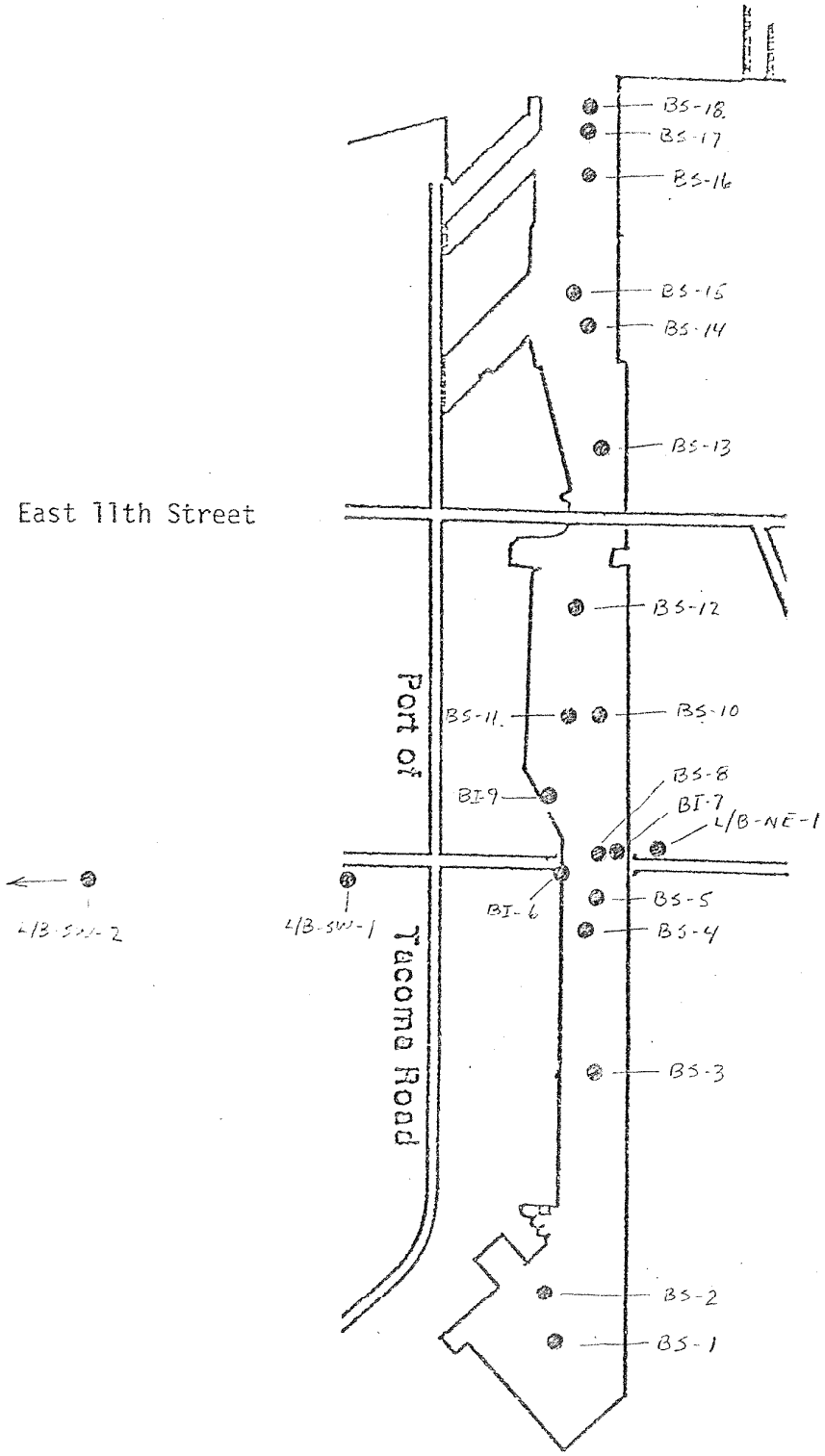


Figure 13. Blair Waterway: sediment samples.

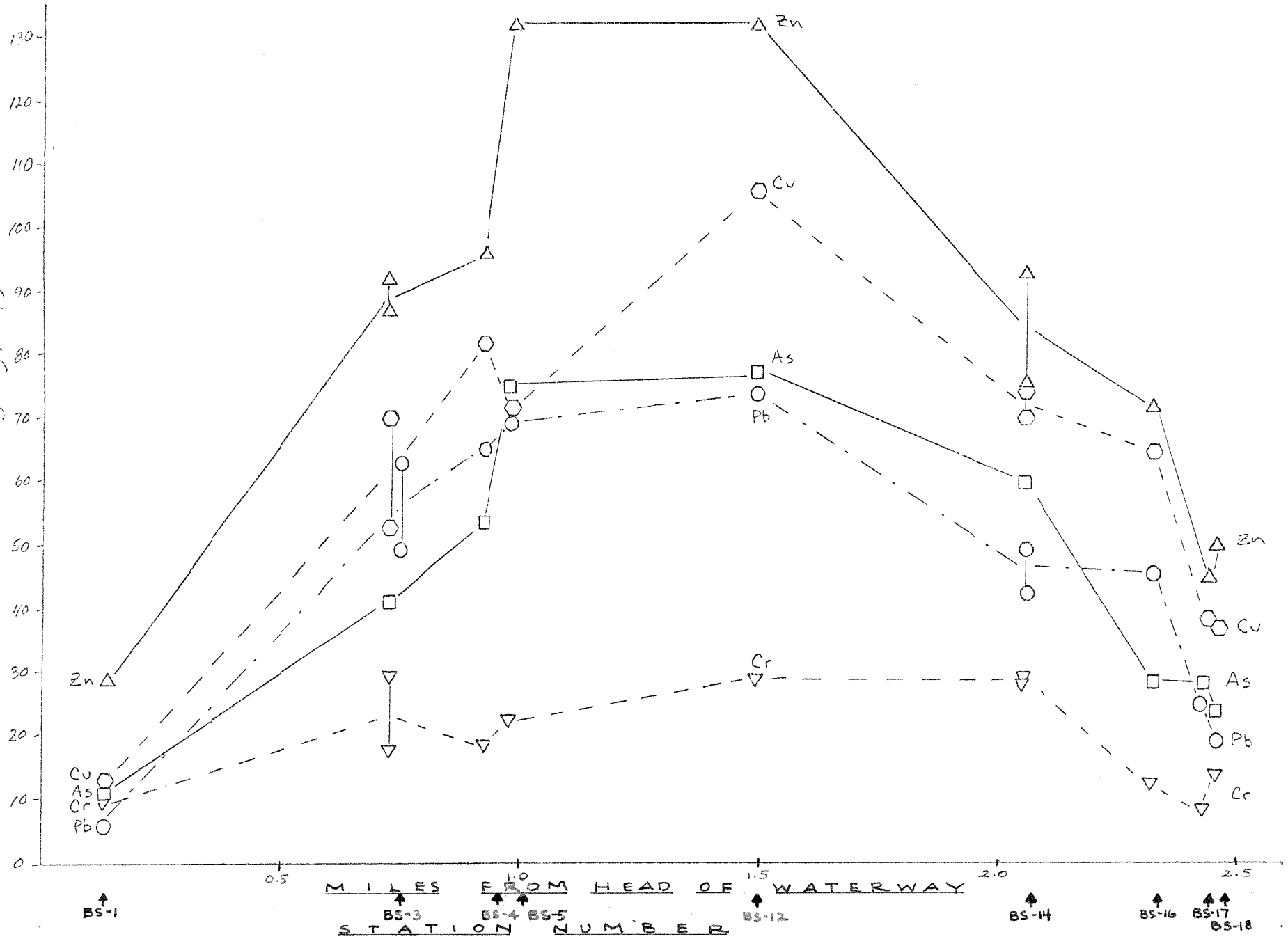


Figure 14. Blair Waterway: concentrations of selected metals in subtidal sediments.

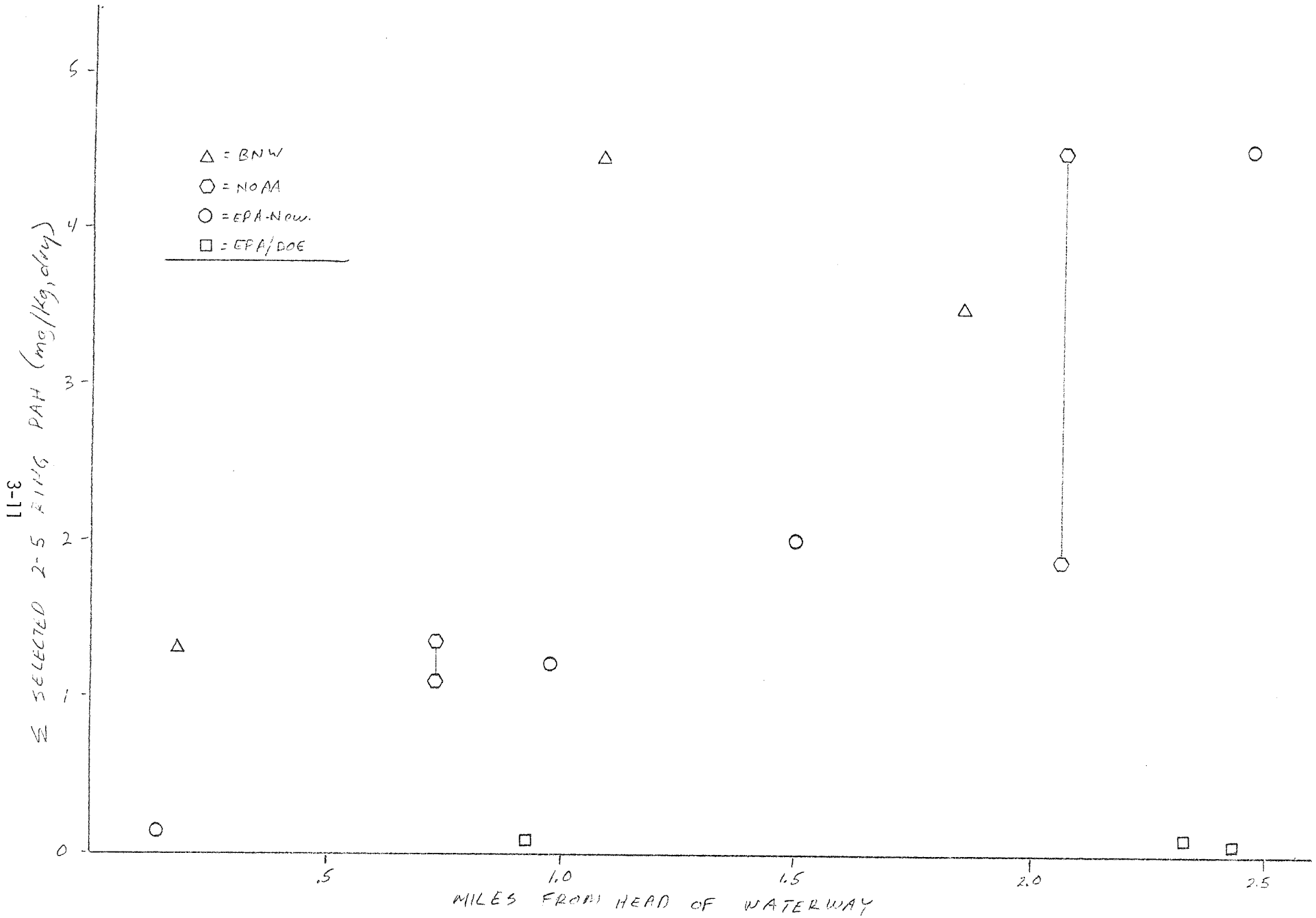


Figure 15. Blair Waterway: selected* PAH compounds in subtidal sediments.

*napthalene, phenanthrene, anthracene, fluorene, pyrene, chrysene, benzo(a)anthracene, fluoroanthene.

Table 18. Blair Waterway: Trace Metal Concentrations in Point Source Discharges (µg/L, total metal).

| Discharge | Date Sampled | Time Sampled | Investi-gator | Sample Number | Station Number | Flow (MGD) | As | Cd | Cr | Cu | Hg | Ni | Pb | Sb | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seepage at Zidell | 9/24/80 | 1015 | EPA | 38311 | 28 | | 66 | <.2 | 170 | 397 | 1.5 | 193 | 100 | <2 | 650 |
| Seepage East of Zidell | 9/24/80 | 1040 | EPA | 38312 | 29 | | 36 | <.2 | 58 | 136 | .63 | 47 | 44 | <2 | 220 |
| Surface Drain at Domtar | 9/24/80 | 1100 | EPA | 38314 | 30 | | 10 | <.2 | 3 | 19 | .21 | 20 | 61 | 5 | 30 |
| Lincoln Avenue Drain, North Shore | 6/3/80 | 1645 | EPA | 22308 | 31 | | 190 | .6 | 4 | 85 | .45 | 17 | 17 | 14 | 50 |
| " | 9/24/80 | 1115 | EPA | 38214 | 31 | | 75 | <.2 | 6 | 19 | .35 | 21 | 25 | <2 | 40 |
| " | 4/21/81 | 1210-1415 | WDOE | | 31 | .88 | 282 | 13.8 | 100 | 37 | .28 | 135 | 134 | | 228 |
| " | 3/29/82 | 1245-1500 | WDOE | | 31 | | 94 | 8 | 10 | 20 | <.20 | 100 | 170 | | 55 |
| Wapato Creek | 6/3/80 | 1405 | EPA | 22311 | 32 | | 3 | .1 | 4 | 8 | .68 | 8 | 12 | 2 | 30 |
| " | 3/29/82 | 1115-1410 | WDOE | | 32 | 2.02 | 66 | <2 | <10 | 30 | .46 | 30 | <20 | | 43 |
| Drain at West Corner, Turning Basin | 6/3/80 | 1415 | EPA | 22310 | 33 | | 6 | .3 | 4 | 35 | .68 | 38 | 10 | 2 | 60 |
| " | 8/17/81 | 1130-1400 | WDOE | | 33 | .51 | 100 | <5 | <10 | 10 | .32 | <10 | <50 | | 15 |
| " | 3/29/82 | 1210-1420 | WDOE | | 33 | 3.10 | 12 | <2 | <10 | 10 | <.20 | <20 | <20 | | 80 |
| Murray Pacific Drainage | 9/24/80 | 1145 | EPA | 38318 | 34 | | 66,000 | 3.2 | 12 | 496 | .49 | 221 | 640 | 189 | 1,780 |
| Lincoln Avenue Drain, South Shore | 6/3/80 | 1440 | EPA | 22309 | 35 | | 75 | .2 | 43 | 21 | .45 | 22 | 35 | 8 | 85 |
| " | 9/24/80 | 1135 | EPA | 38317 | 35 | | 60 | <.2 | 12 | 14 | .21 | 12 | 8 | <2 | 40 |
| " | 5/5/81 | 1100-1400 | WDOE | | 35 | .90 | 46 | <5 | <10 | 7 | <.2 | <50 | <14 | | 50 |
| " | 3/29/82 | 1220-1530 | WDOE | | 35 | 2.69 | 850 | <2 | <10 | 50 | <.20 | <20 | 100 | | 170 |
| Surface Runoff at Stauffer | 9/24/80 | 1115 | EPA | 38315 | 36 | | 36 | <.2 | 4 | 19 | .21 | 43 | 58 | 5 | 70 |

Table 19. Blair Waterway: Trace Metal Loads Based on WDOE Data Collected April 1981 - March 1982 (pounds/day).

| Discharge | Date Sampled | As | Cd | Cr | Cu | Hg | Ni | Pb | Zn |
|---|---|---|---|---|---|---|---|---|---|
| Lincoln Avenue Drain, North Shore | 4/21/81 | 2.1 | 0.10 | 0.74 | 0.27 | 0.0021 | 1.0 | 1.0 | 1.7 |
| Wapato Creek | 3/29/82 | 1.1 | -- | -- | .51 | .0078 | .51 | -- | .73 |
| Drain at West Corner of Turning Basin | 8/17/81 | .43 | -- | -- | .043 | .0014 | -- | -- | .064 |
| " | 3/29/82 | .31 | -- | -- | .26 | -- | -- | -- | 2.1 |
| Lincoln Avenue Drain, South Shore | 5/5/81 | .35 | -- | -- | .053 | -- | -- | -- | .38 |
| " | 3/29/82 | 19 | -- | -- | 1.1 | -- | -- | 2.2 | 3.8 |
| Sum of loads to Blair Waterway[1] | | 4.0 | 0.1 | 0.74 | 0.88 | .011 | 1.5 | 1.0 | 2.9 |
| Sum of loads to Blair Waterway[2] | | 23 | .10 | .74 | 2.1 | .0093 | 1.5 | 3.2 | 8.3 |

[1]Calculated using August Turning Basin Drain data and May south Lincoln Drain data (dry weather).

[2]Calculated using March data for Turning Basin and south Lincoln drain (wet weather).

Waterway: Organic Priority Pollutant Concentrations in Point Source Discharges (µg/L).

| | Seepage at Zidell | Seepage E. of Zidell | Surface Drain at Doctar | Lincoln Avenue Drain, North Shore | | | | Wapato Creek | | Drain at West Corner of Turning Basin | | | Murray Pacific Drainage | Lincoln Avenue Drain, South Shore | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9/24/80 | 9/24/80 | 9/24/80 | 6/3/80 | 9/24/80 | 4/21/81 | 3/29/82 | 6/3/80 | 3/29/82 | 6/3/80 | 8/17/81 | 3/29/82 | 9/24/80 | 6/3/80 | 9/24/80 | 5/5/81 | 3/29/82 | |
| | 1015 | 1040 | 1100 | 1645 | 1115 | 1210-1415 | 1245-1500 | 1405 | 1115-1410 | 1415 | 1130-1400 | 1210-1420 | 1145 | 1440 | 1135 | 1100-1400 | 1220-1530 | |
| | EPA | EPA | EPA | EPA | EPA | WDOE | WDOE | EPA | WDOE | EPA | WDOE | WDOE | EPA | EPA | EPA | WDOE | WDOE | EPA |
| | 38311 | 38312 | 38314 | 22308 | 38214 | 18J-13/14 | J1337 | 22311 | J1335 | 22310 | 33761 | J1336 | 38318 | 22309 | 38317 | 19751 | J1334 | 38315 |
| | 22 | 29 | 30 | 31 | | | | 32 | | 33 | | | 34 | | | 35 | | 36 |
| | | | | | | .88 | | | 2.02 | | .51 | 3.10 | | | | .90 | 2.69 | |
| | -- | -- | -- | 1.8 | -- | -- | a | -- | <10 | -- | -- | a | -- | 5.7 | 7.6 | 1.3 | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | 1.5 | -- | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | -- | 3.4 | 1.1 | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | T | 1.9 | -- | a | -- |
| | -- | -- | -- | -- | -- | 8 | <10 | -- | a | -- | -- | <10 | -- | T | 1.4 | 0.7 | a | -- |
| | -- | -- | -- | -- | -- | 3 | a | -- | a | -- | -- | a | -- | 18 | 3.7 | 2.4 | <10 | -- |
| | -- | -- | -- | T | -- | -- | <10 | -- | a | -- | -- | a | -- | 4.4 | .5 | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | -- | 2.3 | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | 6 | .6 | -- | a | -- |
| | -- | -- | -- | -- | -- | 3 | a | -- | a | -- | -- | a | -- | -- | .5 | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | 72 | a | -- | -- | a | -- | 1260 | -- | -- | a | -- |
| | | | | | | | | | | | | | | | | | | |
| | -- | 2.9 | -- | -- | -- | -- | a | -- | a | -- | 0.3 | a | -- | -- | -- | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | -- | -- | -- | <10 | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | T | -- | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | -- | 7.1 | -- | a | -- |
| | -- | -- | -- | -- | -- | -- | a | T | a | -- | -- | a | -- | -- | 6 | 5.5 | <10 | -- |
| | -- | -- | -- | -- | -- | -- | a | -- | a | -- | -- | a | -- | -- | -- | 1.6 | a | -- |
| | -- | -- | -- | T | -- | -- | a | -- | a | -- | -- | a | -- | -- | -- | -- | a | -- |
| | | | | | | -- | a | | a | | -- | a | | | 8 | -- | a | |
| | | | | | | -- | a | | a | | -- | a | | | 2 | -- | a | |
| | | | | | | 37 | a | | a | | -- | a | | | -- | 3.8 | <10 | |
| | | | | | | -- | -- | | -- | | -- | -- | | | | T | -- | |
| | | | | | | -- | -- | | -- | | -- | -- | | | | T | -- | |
| | | | | | | -- | <5 | | 8 | | -- | 8 | | | | | 10 | |

a = Analyzed, but detection limit high relative to other analyses
T = Trace value is greater than the limit of detection but less than the limit of quantification (1 µg/L in most cases)

Table 21. Blair Waterway: Priority Pollutants in Discharges to the Lincoln Avenue Drainages (µg/L).

| | North Lincoln Drain to Blair | | South Lincoln Drain to Blair | |
|---|---|---|---|---|
| Discharge | Reichhold Storm Drain Effluent | | U.S. Oil Effluent | Sewer Discharge to Lincoln Drain Downstream of U.S. Oil Outfall |
| Date Sampled | 4/21-22/81 | 3/29/82 | 5/5/81 | 5/5/81 |
| Time Sampled | 1415-1415 | 1230-1600 | 1020-1600 | 1215-1545 |
| Flow (MGD) | no discharge | 0.045 | .238 | .577 |
| **Metals** | | | | |
| As | <5 | 7 | <16 | <16 |
| Cd | 12 | <5 | <2 | <2 |
| Cr | 130 | <10 | 45 | 10 |
| Cu | 36 | 10 | 10 | 5 |
| Hg | .4 | 0.76 | .43 | <.2 |
| Ni | 86 | 80 | <10 | <10 |
| Pb | | 150 | 15 | <14 |
| Zn | 85 | 200 | 125 | 70 |
| *Mo | 1,800 | | | |
| **Volatiles** | | | | |
| chloroform | 2 | -- | -- | 3.9 |
| chloroethylene | 161 | -- | -- | -- |
| 1,1-dichloroethane | -- | -- | -- | 2.0 |
| 1,2-trans-dichloroethylene | -- | T | -- | 1.1 |
| 1,1,1-trichloroethane | 8 | T | -- | 6.0 |
| trichloroethylene | 232 | 66 | -- | -- |
| tetrachloroethylene | 422 | -- | -- | 2.2 |
| toluene | 3 | -- | -- | 1.1 |
| dichlorofluoromethane | T | -- | -- | -- |
| trichlorofluoromethane | 320 | 10 | -- | -- |
| **Base/Neutrals** | | | | |
| 1,4-dichlorobenzene | -- | | -- | 0.9 |
| naphthalene | -- | | -- | 9.7 |
| **Acid Extractables** | | | | |
| phenol | 28 | 220 | -- | -- |
| 2-chlorophenol | 68 | 30 | -- | -- |
| 2,4-dichlorophenol | 25 | T | -- | -- |
| 2,4,6-trichlorophenol | 15 | T | -- | -- |
| pentachlorophenol | 182 | 26 | -- | 3.0 |
| *4-chlorophenol | T | -- | | |
| *2,3,4,6-tetrachlorophenol | T | -- | | |
| *2,4-bis(1,1-dimethyl ethyl) phenol | -- | -- | | |
| *3-(1,1-dimethyl ethyl) phenol | T | -- | | |
| **Pesticides** | | | | |
| aldrin | -- | | -- | .4** |
| α-BHC | -- | | -- | .1** |
| **Miscellaneous** | | | | |
| cyanide | <5 | | -- | -- |
| *formaldehyde | .6; 19.7 | 38 mg/L | | |

-- = not detected
T = Trace; value is greater than the limit of detection but less than the limit of quantification
* = not a priority pollutant
** = value not confirmed by mass spectrophotometer

Table 22. Blair Waterway: Organic Priority Pollutant Loads Based on WDOE Data Collected April 1981 - March 1982 (pounds/day).

| Discharge Date Sampled | Lincoln Avenue Drain, North Shore 4/21/81 | Wapato Creek 3/28/82 | Drain at West Corner of Turning Basin 8/17/81 | Drain at West Corner of Turning Basin 3/28/82 | Lincoln Avenue Drain, South Shore 5/5/81 | Lincoln Avenue Drain, South Shore 3/29/82 | Sum of Loads to Blair Waterway[1] |
|---|---|---|---|---|---|---|---|
| Volatiles | | | | | | | |
| chloroform | -- | .084* | -- | -- | .0098 | -- | .094 |
| 1,1-dichloroethane | -- | -- | -- | -- | .0083 | -- | .0083 |
| 1,2-trans-dichloroethylene | .059 | -- | -- | .13* | .0053 | -- | .064 |
| 1,1,1-trichloroethane | .022 | -- | -- | -- | .018 | .11* | .040 |
| toluene | .022 | -- | -- | -- | -- | -- | .022 |
| Base/Neutrals | | | | | | | |
| napthalene | -- | -- | .0013 | | -- | -- | .0013 |
| fluorene | -- | -- | -- | -- | -- | .11* | -- |
| 1,2-dichlorobenzene | -- | -- | -- | -- | .041 | .11* | .041 |
| 1,4-dichlorobenzene | -- | -- | -- | -- | .012 | -- | .012 |
| Acid Extractables | | | | | | | |
| pentachlorophenol | .27 | -- | -- | -- | .029 | .11* | .30 |
| Pesticides | | | | | | | |
| aldrin | -- | -- | -- | -- | .0038* | -- | .0038 |
| α-BHC | -- | -- | -- | -- | .038* | -- | .038 |
| Miscellaneous | | | | | | | |
| cyanide | -- | .13 | -- | .21 | | .22 | .13 |

[1] Calculated using dry flow (August and May) data only for Turning Basin and South Lincoln drains
-- = Not detected
* = Calculated using 1/2 quantification limit

Table 23. Blair Waterway: Sediment Sites.

| Station Code | Original Agency Code | Collector | Analysis By | Location Name | Latitude 47° | Longitude 122° | Date Collected |
|---|---|---|---|---|---|---|---|
| *BS-1 | A-7 | EPA[a] | EPA-New[b] | Blair Waterway at turning basin | 15' 23" | 22' 43" | 5/13/81 |
| BS-2 | 10 | BNW[c] | BNW | Blair Waterway at turning basin | 15' 25" | 22' 49" | 1980 |
| BS-3 | 14-09040 | NOAA[d] | NOAA | Blair Waterway | 15' 45" | 23' 10" | 1979 |
| BS-3 | 14-09040 | NOAA | NOAA | Blair Waterway | 15' 45" | 23' 10" | 1980 |
| BS-4 | 17 | EPA/DOE[e] | EPA/DOE[f] | Blair Waterway near Lincoln Avenue | 15' 50" | 23' 22" | 8/03/81 |
| BS-5 | A-6 | EPA | EPA-New | Blair Waterway near Lincoln Avenue | 15' 54" | 23' 25" | 5/13/81 |
| †BI-6 | | DOE | EPA/DOE | Blair Waterway at Lincoln Drain, south shore | 15' 54" | 23' 30" | 5/05/81 |
| BI-6 | I-12 | DOE | EPA-Con[g] | Blair Waterway at Lincoln Drain, south shore | 15' 54" | 23' 30" | 7/30/81 |
| LB-SW-1 | | DOE | DOE | Lincon Avenue Drain at U.S. Oil Outfall | 15' 39" | 23' 49" | 5/05/81 |
| LB-SW-2 | | DOE | DOE | Lincoln Avenue Drain near Milwaukee Road | 15' 22" | 24' 13" | 5/05/81 |
| LB-NE-1 | | DOE | EPA | Lincoln Drain N side of Blair | 16' 00" | 23' 24" | 4/21/81 |
| LB-NE-1 | I-14 | DOE | EPA-Con | Lincoln Drain N side of Blair | 16' 00" | 23' 24" | 7/30/81 |
| BI-7 | | DOE | EPA | Blair Waterway at Lincoln Drain, north shore | 15' 59" | 21' 25" | 4/21/81 |
| BI-7 | I-13 | DOE | EPA-Con | Blair Waterway at Lincoln Drain, north shore | 15' 59" | 23' 25" | 7/30/81 |
| BS-8 | 9 | BNW | BNW | Blair Waterway near Lincoln Avenue | 15' 58" | 23' 26" | 1980 |
| BI-9 | | DOE | EPA/DOE | Blair Waterway at Stauffer Chemical | 15' 57" | 23' 38" | 9/14/81 |
| BS-10 | 16 | EPA | EPA-Con | Blair Waterway between 11th St. & Lincoln Avenue | 16' 06" | 23' 40" | 8/03/81 |
| BS-11 | 15 | EPA | EPA-Con | Blair Waterway between 11th St. & Lincoln Avenue | 16' 04" | 23' 43" | 8/03/81 |
| BS-12 | L-1 | EPA | EPA-New | Blair Waterway east of 11th Street | 16' 11" | 23' 25" | 5/12/81 |
| BS-13 | 8 | BNW | BNW | Blair Waterway west of 11th Street | 16' 26" | 24' 11" | 1980 |
| BS-14 | 3-09029 | NOAA | NOAA | Blair Waterway, east 11th St. Bridge | 16' 32" | 24' 24" | 1979 |
| BS-14 | 3-09029 | NOAA | NOAA | Blair Waterway, east 11th St. Bridge | 16' 32" | 24' 24" | 1981 |
| BS-15 | 12 | EPA | EPA-Con | Blair Waterway mid-channel off second slip | 16' 32" | 24' 28" | 8/03/81 |
| BS-16 | 10 | EPA/DOE | EPA/DOE | Blair Waterway near entrance | 16' 43" | 24' 39" | 8/03/81 |
| BS-17 | 9 | EPA/DOE | EPA/DOE | Blair Waterway at entrance | 16' 47" | 24' 46" | 8/03/81 |
| BS-18 | A-5 | EPA | EPA-New | Blair Waterway at entrance | 16' 47" | 24' 47" | 5/13/81 |

[a]USEPA (Schwartz)

[b]USEPA - Newport laboratory

[c]Battelle NW (Riley, *et al.*) for NOAA, OMPA-12

[d]NOAA (Malins, *et al.*) OMPA-2, etc.

[e]USEPA (Schwartz), WDOE (Johnson)

[f]USEPA - contract laboratory (organics), WDOE - Tumwater laboratory (metals)

[g]USEPA - contract laboratory

*BS = Blair, Subtidal

†BI = Blair, Intertidal

Table 24. Blair Waterway: Intertidal (and source-related) Surface+ Sediment Priority Pollutant Concentrations (mg/Kg dry weight).

| Station Code | BI-6 | | L/B-SW-1 | L/B-SW-2 | L/B-NE-1 | | BI-7 | | BI-9 |
|---|---|---|---|---|---|---|---|---|---|
| Agency Responsible for Analysis | EPA/DOE | EPA/Con | DOE | DOE | EPA | EPA-Con | EPA | EPA-Con | EPA/DOE |
| Original Agency Code | | I-12 | | | | I-14 | | I-13 | |
| Miles from Head of WW | 1.03 | 1.03 | 1.03 | 1.03 | 1.06 | 1.06 | 1.06 | 1.06 | 1.15 |
| Year Collected | 1981 | 1981 | 1981 | 1981 | 1981 | 1981 | 1981 | 1981 | 1981 |
| Percent Solids | 44.9 | 61.3 | 67.5 | 27.3 | 36.3 | 44.8 | 36.3 | 73.1 | 61.3 |
| **Metals** | | | | | | | | | |
| As | 530 | [15.0] | <5 | 890 | | [150.0] | | [4.4] | |
| Cd | 1.5 | [<.2] | .68 | 6.3 | | [<.2] | | [<.14] | .3 |
| Cr | 53 | [3.3] | 12 | 150 | | [<2] | | [<1.4] | 16 |
| Cu | 200 | [15.0] | 22 | 850 | | [25.0] | | [.7] | 37 |
| Hg | .43 | [<.03] | .14 | | | [<.04] | | [<.03] | <.1 |
| Ni | 24 | [<7] | 12 | 89 | | [<9] | | [<6] | 11 |
| Pb | 210 | [11.0] | 22 | 340 | | [56.0] | | [<10] | 21 |
| Zn | 400 | [51.0] | 150 | 740 | | [98.0] | | [<19] | 68 |
| **Volatiles** | | | | | | | | | |
| toluene | -- | -- | | | .006 | -- | -- | -- | -- |
| 1,1-dichloroethane | -- | -- | | | .003 | -- | -- | -- | -- |
| **Base/Neutrals** | | | | | | | | | |
| 1,2-dichlorobenzene | .12 | a | | | -- | a | -- | a | -- |
| 1,4-dichlorobenzene | .04 | a | | | -- | a | -- | a | -- |
| napthalene | -- | a | | | -- | a | -- | a | .049 |
| anthracene/phenanthrene | -- | a | | | -- | a | -- | a | .39 |
| pyrene | -- | a | | | -- | a | -- | a | .49 |
| chrysene/benzo(a)anthracene | -- | a | | | -- | a | -- | a | .73 |
| fluoranthene | -- | a | | | -- | a | -- | a | .65 |
| benzo(a)pyrene | -- | a | | | -- | a | -- | a | .098 |
| benzo(k)fluoranthene/ 3,4 benzofluoranthene | -- | a | | | -- | a | -- | a | .65 |
| benzo(g,h,i)perylene | -- | a | | | -- | a | -- | a | .049 |
| ideno(1,2,3-cd)pyrene | -- | a | | | -- | a | -- | a | .049 |
| diethyl phthalate | -- | a | | | 1.90 | a | -- | a | |
| butylbenzyl phthalate | -- | a | | | -- | a | -- | a | 2.5 |
| di-n-octyl phthalate | -- | a | | | -- | a | -- | a | 1.6 |
| bis(2-ethylhexyl) phthalate | 22.0 | a | | | -- | a | -- | a | -- |
| **Acid Extractables** | -- | a | | | -- | a | -- | a | -- |
| **Pesticides and PCBs** | | | | | | | | | |
| a-BHC | T | -- | | | -- | -- | -- | -- | -- |
| g-BHC (Lindane) | T | -- | | | .0066 | -- | .0025 | -- | -- |
| PCB-1248 | -- | -- | | | -- | .74 | -- | -- | -- |
| total PCBs | -- | -- | | | -- | .74 | -- | -- | -- |

+ = All data represent samples obtained from the top 2-5 cm of sediment
[ ] = Weak acid digestion (0.1 N nitric acid with 5 g. wet sediment)
-- = Not detected
a = Not detected, but detection levels too high to be useful
T = Trace amounts

Table 3-2. Blair Waterway: Subtidal Surface* Sediment Priority Pollutant Concentrations (mg/Kg dry weight).

| Station Code | BS-1 | BS-2 | BS-3 | | BS-4 | BS-5 | BS-8 | BS-10 | BS-11 | BS-12 | BS-13 | BS-14 | | BS-15 | BS-16 | BS-17 | BS-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Responsible for Analysis | EPA-New | BNW | NOAA | NOAA | EPA/DOE | EPA-New | BNW | EPA-Con | EPA-Con | EPA-New | BNW | NOAA | NOAA | EPA-Con | EPA/DOE | EPA/DOE | EPA-New |
| Original Agency Code | A-7 | 10 | 14-09040 | 14-09040 | 17 | A-6 | 9 | 16 | 15 | L-1 | 8 | 14-09029 | 14-09029 | 12 | 10 | 9 | A-5 |
| Miles from Head of WW | .14 | .18 | .73 | .73 | .93 | .99 | 1.07 | 1.29 | 1.30 | 1.50 | 1.85 | 2.06 | 2.06 | 2.09 | 2.33 | 2.44 | 2.47 |
| Year Collected | 1981 | 1980 | 1979 | 1980 | 1981 | 1981 | 1980 | 1981 | 1981 | 1981 | 1980 | 1979 | 1981 | 1981 | 1981 | 1981 | 1981 |
| Percent Solids | 74.9 | | 56 | 51.7 | 49 | 50.4 | | 56.3 | 49.4 | 50.6 | | 59 | 47 | 68.5 | 58 | 65 | 69 |
| Metals | | | | | | | | | | | | | | | | | |
| As | 11 | | | 46.4 | 53 | 75 | | [14.0] | [15.0] | 77 | | | 60 | [3.5] | 28 | 28 | 24 |
| Cd | .13 | | (6.02) | .657 | .45 | .34 | | [<.2] | [<.2] | .36 | | (5.45) | <.10 | [<.2] | .48 | .34 | .26 |
| Cr | 10.2 | | 29.5 | 17.6 | 18 | 22.6 | | [25.0] | [3.60] | 28 | | 27.9 | 29 | [.9] | 12 | 8.8 | 14.3 |
| Cu | 13 | | 69.9 | 52.6 | 82 | 72 | | [44.0] | [49.0] | 106 | | 59.6 | 74 | [19] | 65 | 38 | 37 |
| Hg | | | .157 | <.077 | .16 | | | [<.04] | [<.04] | | | .132 | .26 | [<.04] | .14 | <.1 | |
| Ni | | | 22.4 | | 15 | | | [9.2] | [18.0] | | | 21.1 | | [.5] | 12 | 11 | |
| Pb | 6 | | 49 | 62.9 | 65 | 69 | | [28.0] | [39.0] | 74 | | 42.5 | 49 | [13.0] | 46 | 25 | 19 |
| Zn | 28 | | 92.2 | 87.0 | 96 | 132 | | [50.0] | [83] | 132 | | 75.4 | 93 | [48.0] | 72 | 45 | 50 |
| Volatiles | | | | | -- | | | -- | -- | | | | | | | | |
| Base Neutrals | | | | | | | | | | | | | | | | | |
| Chlorobenzene | -- | | .002 | .0021 | -- | -- | | a | a | -- | | .003 | .0028 | a | -- | -- | -- |
| Hexachlorobutadiene | -- | -- | .002 | .0025 | -- | .228 | -- | a | a | -- | -- | .006 | .0044 | a | -- | -- | -- |
| Naphthalene | -- | .026 | .060 | .032 | -- | T | .154 | a | a | .050 | 2.434 | .440 | .140 | a | -- | -- | .313 |
| Acenaphthene | | | .010 | .0061 | -- | | | a | a | | | .090 | .028 | a | -- | -- | |
| Acenaphthalene | | | .001 | .0044 | -- | | | a | a | | | .030 | .023 | a | -- | -- | |
| Anthracene/phenanthrene | -- | .213 | .17 | .16 | T | .147 | .874 | a | a | .39 | .295 | .80 | .38 | a | T | -- | .557 |
| Fluorene | -- | .019 | .007 | .020 | -- | .022 | .111 | a | a | .078 | .094 | .080 | .042 | a | -- | -- | .061 |
| Pyrene | .048* | .228 | .190 | .230 | T | .540* | .553 | a | a | .860* | .231 | .870 | .460 | a | -- | -- | 2.960* |
| Chrysene/benzo(a)anthracene | .029* | .493 | .44 | .69 | -- | .515 | 1.60 | a | a | .582 | .405 | 1.46 | .53 | a | -- | -- | .643 |
| Phenanthrene | | .363 | .230 | .240 | T | | 1.15 | a | a | | .036 | .900 | .370 | a | -- | -- | |
| Dibenzofuran | | .147 | .060 | .110 | -- | | .159 | a | a | | .525 | .190 | .150 | a | -- | -- | |
| Benzo(b)fluoranthene/ 11-benzofluoranthene | | | .250 | .360 | T | | | a | a | | | .720 | .550 | a | -- | -- | |
| Fluorene | | .081 | .100 | .300 | -- | | .278 | | | | .221 | .220 | .098 | | | | |
| Benzo(1,2,3-cd)pyrene | | | .070 | .070 | -- | | | a | a | | | .180 | .064 | a | -- | -- | |
| Butyl benzyl phthalate | .092 | | | | -- | -- | | a | a | -- | | | | a | -- | -- | -- |
| Bis(2-ethylhexyl) phthalate | .290 | | | | .38 | 1.725 | | a | a | 1.07 | | | | a | .48 | T | .578 |
| Butylbenzyl phtnalate | -- | | | | -- | .180 | | a | a | .079 | | | | a | -- | -- | -- |
| Di-n-octyl phthalate | .091 | | | | -- | .107 | | a | a | -- | | | | a | -- | -- | .110 |
| Diethyl phthalate | -- | | | | -- | T | | a | a | .009 | | | | a | -- | -- | -- |
| Dimethyl phthalate | -- | | | | -- | -- | | a | a | T | | | | a | -- | -- | .426 |
| PCB Cycloctables | | | | | -- | | | a | a | | | | | a | -- | -- | |
| Aldrin, Dieldrin and PCBs | | | | | | | | | | | | | | | | | |
| Alpha-chlordane | | | .003 | -- | -- | | | -- | -- | | | .0001 | .0001 | -- | -- | -- | |
| 4,4'-DDD | -- | | .002 | .0011 | -- | -- | | -- | -- | -- | | .006 | .001 | -- | -- | -- | -- |
| 4,4'-DDE | -- | | .0002 | .0029 | -- | -- | | -- | -- | -- | | .001 | .0002 | -- | -- | -- | -- |
| 4,4'-DDT | -- | | .002 | .0029 | -- | -- | | -- | -- | -- | | .003 | .0016 | -- | -- | -- | -- |
| Total DDT forms | -- | | .0053 | .0098 | -- | -- | | -- | -- | -- | | .0134 | .0034 | -- | -- | -- | -- |
| PCB 1242 | -- | | | | -- | T | | -- | -- | -- | | | | -- | -- | -- | -- |
| PCB 1260 | T | | | | -- | -- | | -- | -- | -- | | | | -- | -- | -- | -- |
| Total PCBs | T | .025 | .035 | .059 | .03 | T | .128 | -- | -- | -- | .021 | .0223 | .054 | -- | -- | -- | -- |

* = All data represent samples obtained from the top 2-5 cm of sediment
* = Pyrene + fluoranthene
a = Not detected, but detection levels too high to be useful
T = Trace amount
-- = Not detected
[ ] = Weak acid digestion (0.1 N nitric acid w/5 wet g. of sediment)
( ) = Because it appears these data may be anomalous, they were not used for graphical or statistical interpretation

Table 26. Summary of Blair Waterway Sediment Priority Pollutant Data (mg/Kg dry weight).

| Constituent | Intertidal (including source-related) Sediments | | Subtidal Sediments | | |
|---|---|---|---|---|---|
| | Minimum | Maximum | Minimum | Maximum | Median |
| **Metals*** | | | | | |
| As | <5 | 890 | 11 | 77 | 53 |
| Cd | .3 | 6.3 | <.10 | .66 | .34 |
| Cr | 12 | 150 | 8.8 | 29.5 | 18 |
| Cu | 22 | 850 | 13 | 106 | 70 |
| Hg | <.1 | .43 | <.077 | .26 | .16 |
| Ni | 11 | 89 | 11 | 22.4 | 15 |
| Pb | 21 | 340 | 6 | 74 | 49 |
| Zn | 68 | 740 | 28 | 132 | 87 |
| **Volatiles** | | | | | |
| toluene | -- | .006 | -- | -- | -- |
| 1,1-dichloroethane | -- | .003 | -- | -- | -- |
| **Base/Neutrals** | | | | | |
| 1,2-dichlorobenzene | -- | .12 | -- | -- | -- |
| 1,4-dichlorobenzene | -- | .04 | -- | -- | -- |
| hexachlorobenzene | -- | -- | -- | .003 | (.0025) |
| hexachlorobutadiene | -- | -- | -- | .228 | (.003) |
| naphthalene | -- | .049 | -- | 2.434 | .055 |
| acenaphthene | -- | -- | -- | .090 | (.02) |
| acenaphthalene | -- | -- | -- | .030 | (.004) |
| anthracene/phenanthrene | -- | .39 | -- | .874 | .2 |
| fluorene | -- | -- | -- | .111 | .05 |
| pyrene | -- | .49 | -- | .870 | .23 |
| chrysene/benzo(a)anthracene | -- | .73 | -- | 1.6 | .47 |
| fluoranthene | -- | .65 | -- | 1.15 | .24 |
| benzo(a)pyrene | -- | .098 | -- | .525 | .13 |
| benzo(k)fluoranthene/ 3,4-benzo fluoranthene | -- | .65 | -- | .72 | .45 |
| perylene | -- | -- | -- | .30 | .15 |
| ideno(1,2,3-cd)pyrene | -- | .049 | -- | .18 | .07 |
| diethyl phthalate | -- | 1.9 | -- | .092 | -- |
| bis(2-ethylhexyl) phthalate | -- | 22 | T | 1.725 | .48 |
| butylbenzyl phthalate | -- | 2.5 | -- | .18 | -- |
| di-n-butyl phthalate | -- | -- | -- | .11 | -- |
| dimethyl phthalate | -- | -- | -- | .009 | -- |
| di-n-octyl phthalate | -- | 1.6 | -- | .246 | -- |
| **Pesticides and PCBs** | | | | | |
| α-chlordane | -- | -- | -- | .003 | .00017 |
| α-BHC | -- | I | -- | -- | -- |
| γ-BHC (Lindane) | -- | .0066 | -- | -- | -- |
| 4,4'-DDD | -- | -- | -- | .006 | .0017 |
| 4,4'-DDE | -- | -- | -- | .0029 | .0007 |
| 4,4'-DDT | -- | -- | -- | .003 | .0025 |
| total DDT forms | -- | -- | -- | .0134 | .0075 |
| PCB-1242 | -- | -- | -- | T | -- |
| PCB-1248 | -- | .74 | -- | T | -- |
| total PCBs | -- | .74 | -- | .128 | (.02) |

* = Strong acid digestion data only
-- = None detected
T = Trace amount
( ) = Estimated median